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in the home in early childhood, the boy will probably go through life without it.

That great thinker whom I have quoted before, the late John Stuart Mill, looked upon it as an absurdity that history and geography should be taught in schools at all, and his reason for this opinion was that no one ever really learnt history and geography except by private reading. I doubt whether Mill would find many practical schoolmasters to agree with this dictum of his, for considerable information on these subjects can be acquired by class-room work, but undoubtedly in such subjects as these there is a great opportunity for encouraging interest by reading and conversation. To understand history and geography little technical knowledge is needed, and the interest of the subjects is such that it appeals to most intelligent human beings. Parents can do much to encourage interest in these subjects in their children by talking to them about them, by showing them pictures and by placing in their hands interesting works. Of books which are instructive without being heavy there is nowadays a vast stock. Such are biographies of national heroes, such as Macmillan's "Men of Action" series, and some of Froude's works on the Elizabethans, accounts of travels and adventure in foreign lands, historical novels, especially Scott's, volumes of light science, such as Hutchinson's works on extinct animals. Of considerable help to a boy in his historical studies is an intelligent reading of the daily paper, not the mere mechanical reading of it, but such an intelligent reading as means a clear apprehension of the present condition of the world, so far, at least, as the boy can comprehend it. To take the instance which most naturally occurs to one at the present moment. How much a boy's understanding of the wars of history will be increased by an understanding of the war that is going on in South Africa to-day! Much as war has changed, there is much in war that is unchangeable—the difficulties of feeding and moving large bodies of men, the fundamental principles of strategy and tactics, the dangers, the hardships, the excitements and the dulnesses, and the boy who has digested the despatches from correspondents and the letters from soldiers at the front will assuredly be better able to understand the wars of Wellington and Marlborough.

(To be continued.)

THE ART OF BREATHING.

BY E. R. MATZKE.

PERHAPS to some of us here, the title I have given to my subject may seem extravagant—yet there is no doubt that to breathe perfectly is an art not learned in a day or a month, but will require years to bring it to perfection. For like any other art it requires our own effort and energy, our concentration, will and enthusiasm. The importance of proper breathing can scarcely be overestimated. It might be well to draw attention to this valuable fact, especially at a time when the active rush of life seems ever on the increase.

It may surprise some of my readers to learn, that not 10% on the average, breathe in the manner in which nature intended them to do. Yet such is the case! This is no new theory to the medical profession; the subject has occupied the attention of many leading physicians. In Germany perhaps especially; and foremost amongst them may be mentioned the late Dr. Paul Niemeyer, who devoted his whole thought and energy to the study of the lungs, the respiratory organs and the diseases to which they are subject. He has left most valuable records. His work on *Die Lunge* is of special importance, bringing before us, as it does, in forcible and simple language, the result of many years' practical experience. It will be found that he mainly attributes the different diseases of the chest, and general debility, to *imperfect* breathing. He considers that if some method of restoring natural respiration were found, it would be the means of curing many forms of lung disease, which have hitherto defied the skill of physicians. The care and training of the respiratory organs belong to those things which with us (the civilized nations, as we proudly call ourselves) are not only the *least understood* or *cultivated*—but are *altogether put on one side and neglected*. That is not all! We not only ignore and neglect those organs, but we subject them from day to night and from night to day, to ill-treatment, and then are astonished when we find disease set in and the organs destroyed. Dr. Paul Niemeyer says: "While among savage nations, consumption of the lungs is

almost unknown, there is a terrible preponderance of that disease amongst civilized peoples: and quite four-fifths of the prevalent illnesses and diseases may be placed under that heading; and quite *half* the deaths which occur between the ages of 15-25 are due to consumption."

This is a grave state of things, and surely that time has come when we ought to ask ourselves seriously—how to remedy it? Nature has given us all the organs which we need for our perfect health and well being; and if we used them as she intended, *all* would be well. But, alas! we have through our own carelessness allowed some of our most important organs to remain passive—*others* only used partially—and have given double and treble the work to the rest, and thus have weakened the whole system. Nature has made our body so beautifully, and arranged the machinery of that body "*self-working*," which means that all the different organs help each other in their work and functions, and indeed *rely on each other's help to keep in order the whole*.

The lungs are our subject at present; and it may be as well to explain how not only are *they themselves* affected by imperfect action, but also our general health. Those who live an *out-of-door, active life* and are *therefore* constantly in the open air, are more likely to breathe instinctively as nature intended than those who lead an indoor life (not necessarily a sedentary one) and seem to have lost their power of using the lungs freely and wholly. The human frame and body can live and be well on the most simple food (as we heard from Dr. Nansen and his crew) if we have *good pure air*, and are able to breathe it fully and freely;—but, however nourishing the food may be, if the breathing be shallow and short, and does not thus get a sufficient amount of air into the lungs to oxydize the blood and expel the carbonic acid—we must, sooner or later, lose our health and become enfeebled. We *can* live and exist for *several days without food—but not five minutes without air*. We have three or four meals in 24 hours; we must breathe about 25,000 times within that period. These facts and others, which anyone can examine and prove on themselves, show us the vast importance of the lungs and their work and the *care* we ought to devote to keeping them in thorough working order; for *they* are the hardest worked organs in our body. We use about 300 quarts of air every hour and

must consequently breathe many hundred times, and which organs do it all? The lungs! This, then, ought to make us think *earnestly* how we could *possibly* lighten the burden of work of those organs and not, as we do, hinder their action by dress, bad habits, and carelessness.

Fortunately we can help, thanks to nature, who has made everything on a grand, perfect scale;—and if we will only listen to her divine voice, which with motherly tenderness warns us not to go against her laws or ignore them, we shall be right; and our bodies will be fit for all the strain and work of this life. The first thought must be for the young, the future men and women, and therefore parents should *watch their children's breathing daily*, and pay every attention to the action of their respiratory organs—they should try and detect for themselves if *both* lungs of the child work *evenly*, and make it inflate the lungs thoroughly and fully—but see that the inflation begins at the base of the lungs, without raising the collarbone. With Argus eyes should the straightness of the spine be watched, especially in the very young—and if the least curvature be detected, examine their breathing, for in many of those cases unevenness of lung action will be found, that is, that only one lung works normally, while the other is feeble in its respiration. We should at once give exercises to make the enfeebled lung active, and working normally. These ought to be done very regularly and carefully, so as not to overtire the weak organ. Wonderful is the result and the effect thereof, and often a lung which was neglected before, will, after working a month or two, carefully and regularly become quite right and the spine will have its normal balance and become straight. Alas! too often is this simple remedy overlooked, and children go on from year to year growing slowly but surely into feeble beings. In some instances bodily gymnastics are applied, for which the child has not the nervous power, nor the necessary lung capacity with which to do them, and in more than one case more harm than good comes of it,—for after all the *lungs* are our *spinal balance*, and everyone should watch their lungs and make them work *evenly*.

This much about the normal action of the lungs on the straightness of our body. I should like to draw attention to the fact which I have experienced in my seven years' practice

concerning the unevenness of working power of our lungs, that its cure is not only achieved by the young, but that under my own supervision and teaching, I have had splendid results in patients between the ages of 40 and 50; and my belief is that almost everyone can attain this valuable end by careful study and patience,—the last being a very important factor. As I must repeat, it is not learned in a week or a month,—it may require a year, or even years, to get to that result, but that should not stand in our way; and we should go on from day to day practising regularly, and without doubt a satisfactory change in our whole being will be experienced.

The second important fact of uneven work of our lungs is, that in many cases it is the *secret* originator of *different internal illnesses* which in time develop into disease. This can be proved quite easily. By examination we find that the lungs touch the diaphragm, and affect its rising and falling by inhalation and exhalation. The diaphragm is the large muscle which divides the chest from the abdomen. If we breathe evenly, that is, if both lungs work alike, the pressure of the diaphragm, by its descent, when the lungs are inflated, upon the organs is equal. But, if on the other hand one lung works more powerfully and deeply than the other, the pressure of the diaphragm becomes also one-sided; and it stands to reason that some of the organs *must* be *pushed out of place*, and some prevented from fulfilling their functions. This last-named defect of breathing is often the cause of different diseases and sufferings of women, and *serious attention and care* ought to be devoted to correcting it.

We will now fix our attention on *deep breathing*, which consists of "inhaling," that is, of taking the air in, and of "exhaling," which means expelling the used air and bad gases out of our lungs. This shows us two distinct actions, the one of "taking in," the other of "giving out." In each of these actions different muscles are used to enable them to perform their functions—and we must pay individual attention to both of these acts, if we want to work well and normally. The *important* act is the *expelling* of air—for if we *do not expel* we *cannot take in*. Strange to say, I have never heard this act of work of the lungs mentioned, nor seen it impressed upon patients—all value is put upon taking in the air. If we compare the lungs to a sponge, it will be easy to understand

the value of expelling and the benefit we derive from it. Let us then imagine a sponge, saturated with water, so that all its many different cells are filled to their utmost extent; we could not, however much we wished, put in more—for all is full. We squeeze the sponge, and by doing so expel a certain amount of water—yet we have not squeezed it to its last drop and have left perhaps *half* the quantity of water in the sponge—therefore the sponge can only take in the *same amount* of water as that which *has been expelled* and which in this instance was *half* the *original* quantity. Thus in refilling, *only half* the amount would be *fresh*, the *other half* being *that which was taken in first*. So it is with the lungs,—the *more* we *expel*, the *more* we are able to *take in*—and our aim *should be* gradually to *expel more* and *more* of the used air and so get rid of the carbonic acid, and make room for *fresh* air with its oxygen and ozone. The machinery of the lungs acts automatically, that is, the muscles move independently of our will. Yet we can get them under the influence of our will and so make them act voluntarily.

This then we ought to do, and every day should have its fixed time for a quarter of an hour of lung gymnastics, which ought to be done either early in the morning after a bath, or an hour after lunch or two hours after dinner; no exercises should be done after bodily fatigue, and of course never without the doctor's consent after an illness of any kind. We should never do our lung gymnastics in the same room we slept in, *unless* it has been well aired and ventilated—for there are still a great many people who sleep without any ventilation in their room. Unless there is a fog (which, alas! there is sometimes here in winter), we should do our respiration at an open window and not fear the air, inflating the lungs by the *nostrils* and filling them slowly and *noiselessly*—watching that we do not raise our shoulders and collar-bone, but seeing that the ribs extend and so the whole thorax, the chest. We shall feel, by putting the hand gently on the diaphragm, that when we *inhale* (that is take in the air) the diaphragm *descends* and by *that* touches different organs, the liver, stomach, etc.; and when we *exhale* (that is expel the air) it rises and with it the organs below it. This is of the greatest importance, for, by this movement—the rising and descending of the organs and diaphragm, the digestive organs are aided in their function—

the liver's difficult task is helped immensely and is prevented by it from becoming sluggish. It is, if one may say so, a natural massage which nature wisely arranged particularly for those organs; and if we make the lungs work voluntarily, and by it thoroughly, we will find that many of our sufferings are removed. The importance is, to watch the breathing of the children and so prevent it becoming shallow—to make them *frequently breathe* deeply, so that their nature accustoms itself to it, and their muscles perform their work easily. The tubercle bacillus thrives and spreads rapidly in weak and badly ventilated lungs, while on the other hand it has not the chance of rooting in active and well-ventilated ones, and there would be every hope of diminishing that secretly creeping illness, consumption, if what I mentioned before were more taken into consideration and practice.

Deep and normal breathing aids the heart and diminishes its work, and so prevents over-fatigue and strain. This seems quite easy to understand; for everyone must have noticed and experienced, that by running or even walking upstairs we often feel the much quicker beating of the heart and we find ourselves breathless. That need not be if we were to breathe naturally and normally, and learned to keep the air in our lungs, so that if we have an exertion of walking upstairs we need not breathe oftener than in ordinary walking, for the oftener we breathe, the oftener the heart beats—the more work we give it. This breathlessness comes from shallow breathing, and if we examine people's lungs who get out of breath at the least exertion, we shall find that they have no lung capacity—that their lungs are overcrowded by stagnant air, and by it the heart is pushed into one corner, as it were, and cannot perform its functions with ease for want of room. On the other hand if we breathe normally, and have our lungs under our control and will, and have achieved the power of keeping the air in our lungs for 30, 40, or 60 seconds, we do our work, like mounting or walking up stairs, with ease, and arrive at the top perfectly comfortable and cool. This holding in of breath can only be learned by slow degrees; and to be able to do it well, we must keep elastic lungs, which we only get by practising *exhalation*, and expelling more and more of the stale air and bad gases, and so prevent the lungs from being overcrowded.

The holding of breath is most useful for health, strength

and ventilating the lungs. *For Health*—if there comes a gust of wind, we can wait before breathing that cold air into our lungs, and so prevent colds in the head, sore throats, bronchial catarrh, etc.; if we pass unwholesome places or bad smells, we refrain from drawing the poison into our system. *For Strength*—we can in athletic sports, like running or swimming, keep up longer, and keep, even for a minute or longer, under water. The lifting of heavy weights can be done without any fear of injury, if the air is kept perfectly still in the lungs, so that by the lungs and diaphragm the other organs are kept and fixed in their respective places. *For Ventilating the lungs* it is invaluable; for when we have drawn in the pure fresh air and keep it in for 30, 40, or more seconds, the air forces itself into the most remote air-cells, and so goes far deeper into all the little corners (and sweeps and dusts them, as it were), which ordinary respiration could not reach.

We see, then, that by thoroughly expelling as much as we can the used air, and breathing deeply and fully, we help our whole system. The heart foremost; for by proper natural working of the lungs we can take in a larger quantity of air and thereby bring more oxygen into our blood. We breathe slower in consequence and thus help the work and action of the heart and save that organ immensely. By taking in more oxygen, our blood becomes well oxydized, and is able to feed the nervous power of our body. By using the lungs fully and not partially, we help the digestive organs and give more space to the heart to perform its functions with ease. We also prevent the too frequent consciousness of the liver, and the troubles in those regions would be diminished if not absolutely cured. The elasticity of our body is greatly dependent on the elasticity of our lungs; we see this over and over again in people with abnormal muscular power. All this we have heard shows us *how* important it is to get our respiratory organs into good order, and that we have to learn the art of breathing just as we learn swimming, riding, running, etc. It is not enough simply to go into a good climate—many do not benefit much by it. They are as it were at the spring of life, but die,—not suddenly, but gradually of thirst—because they do not know how to drink of the “Ocean of pure living air!”

The farmer who is out of doors the whole day and in all weathers does not necessarily inhale the air with all the power his lungs possess, but his activity and work in pure air force him to take in more air and consequently more oxygen than those who live in a town where the air is less oxydized and pure. This then shows that we who live in towns ought to pay double the amount of attention to our breathing and prevent its getting shallow, as that impoverishes the blood and stops free circulation. We hinder the action of the lungs greatly by dress, especially women, who will have their waists measuring 19-22 inches round, quite ignoring their insides and forgetting that the organs remain the same, and if moved from one side must find room in the other, and by their displacement disturb the whole arrangement for which they themselves have to suffer sooner or later. The different organs are pushed up and down and out of their respective places and must consequently press on other organs and often create inflammation. Stomach and liver are nowhere, or rather *everywhere* where they ought *not* to be. The heart is pressed against the walls of the thorax with no room for its proper action. The bases of the lungs are absolutely stiff in their bondage of hard unelastic stays; and consequently the whole work falls on the tips of the lungs which cannot act properly for want of room. The heart has not got the help it requires of the lungs—the blood becomes impoverished; headache, congestion in different organs, nervous debility, indigestion, liver and kidneys are felt. Let us think a moment why we inflict those troubles on our poor body—for what? a small waist—which has lost, by its stiff enclosure, all real beauty of line and grace, and has become an artificial figure;—for the sake of *that*, we have burdened ourselves with quite unnecessary sufferings. It seems incredible that we women in this century fall under the yoke of such a weakness, which under circumstances becomes sin. Men are more inclined to breathe with the whole lungs, their dress being generally hygienic, but in spite of hygienic and loose dress, we find over and over again, poor *shallow* breathers, with unelastic and *overcrowded* lungs;—this shows us that dress of itself will not ensure proper breathing, although it is of the greatest assistance to it.

Let us remember that to live and enjoy life, we *must* keep the machinery of our body in good order, and if we will only think for a moment what an important part our lungs take in our very existence, and that it is by them we live, and that these organs are constantly at work, never resting day or night—never—not for two minutes, it is *then* that we feel with all its *force* the importance of elastic lungs, which we only get by employing deep, natural breathing and using both lungs fully and not partially. We further must remember that our lungs and heart depend on each other; the former brings, as it were, the blood into our system and the latter pumps it through it. Since I have made this study, which of course must be like any other subject that we take up seriously—a life's study—and have seen under my own eyes the wonderful results in regaining health and power by its use and practice, I cannot impress too strongly on everyone, young and old, rich and poor, not to wait until illness and unfavourable symptoms force us to take it up, but to commence *at once*, while the organs are well and the general physique permits the full and free use of the lungs, and so prevent disease and debility.

We all can have this luxury, it costs nothing but our own will and effort, and half an hour of our time a day, devoted to the health of our own body. We have to walk about with it and bear its troubles, so why not do all that is possible to enjoy its companionship? It must, however, be understood that we cannot cure everything by it—nor prevent different illnesses of our body—but if we help nature, we help the doctors in their most charitable and noble profession, to regain and develop health, which includes almost every blessing in this life.

It was not originally my intention to touch upon the aspect of breathing from any but a hygienic point of view, but I have been particularly requested to say a few words with regard to breathing for vocal purposes. I have no hesitation in saying that the *natural deep* breath, which is the best for health in general, is also best for singing and speaking. This is a fact which is unfortunately very frequently *ignored*. When my or *denied* by masters of singing and elocution. When my health gave way, owing to an inherited weak constitution, my doctor's advice was, "Sing, it will strengthen your

lungs!" I had the advantage of being introduced to the importance of diaphragm breathing by Madame Sophie Löwe, under whom I studied singing. Had I then not been taught to use my lungs in the right and proper way, singing might have proved fatal to me. It stands to reason that a method which strengthens the lungs and diaphragm *must* have *good* results, as the powerful muscles of the latter are almost the most important factors in voice production. Real beauty and steadiness of tone can only be achieved to perfection by the entire mastery of the diaphragm. It will take a long time to acquire this thoroughly—but, though difficult, we must not give up if we do not succeed at once. The lungs must be worked, as I said before, in regard to health so for voice production,—our aim *is* and *must be* to have *elastic* lungs which enables the tone to vibrate within them. We must accustom ourselves to fill our lungs through the nostrils, which lightens the work of taking in the air greatly. By so doing, the stream of air is modified and the air cells are able to take it in with ease—whereas in breathing through the mouth, the rush of air is too great and overpowering, and consequently the lungs take in much less. We must guard against overcrowding the lungs if we wish to produce tone easily. Our whole thought must be directed to even exhalation and to trying to keep the upper part of the chest quiet, and to refill the lungs by the diaphragm. We must learn to keep the air in our lungs and not allow it to rush out immediately we open our mouth for speaking or singing. To produce voice with ease without tiring the chest, throat and its organs, we require a volume of air in our lungs, so that the vocal chords and surroundings are set into vibration by the power of the column of air which tries to force its way through the vocal chink. If our voice is based upon breath (which is air) and has that as its support, we run no risk of damaging the lungs, the throat, or its organs. If, on the other hand, we have not learned the mastery of our breath, we shall find that we must strain all the vocal organs, and so create an enlargement of muscles in throat and mouth cavity, which often is such as to gradually almost close the throat passage and we feel pain and fatigue in chest and throat after the slightest vocal exertion. We see, then, that normal breathing is the foundation for the art of singing, and

we must remember that the lungs are not only the conservers of the air, but the motor power in tone production. We often hear people say, "The Italian method of singing is best!" There is a great deal of truth in it, as the Italians were the people who in former times developed the *art of breathing* before they thought of the cultivation of the voice, and had in consequence good results, the voice being produced without any effort or strain, round and full, and not injured by the wear and tear of forced production. The subject is too large; it is quite impossible to go into it satisfactorily in such brief moments as this. I cannot do better than quote what the great master of singing and voice production, Francesco Lamperti, said: "He who has the best command over his breath, is the best singer!" Lastly, I should like to recommend *strongly* and *seriously*, *deep*, *quiet* and *normal* breathing for the special exercise of bicycling. Much injury and distress would be avoided (from over-fatigue and strain) were the "art of breathing" better understood and practised.